

**SECRET**

determination means for determining the quantization characteristics of a lower hierarchy data having a resolution higher than that of an upper hierarchy data, based on the activity of said upper hierarchy data having a low resolution, to quantize each hierarchy data; and

~~2. The picture encoding apparatus according to claim 1, wherein~~

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respective hierarchy data.

3. The picture encoding apparatus according to claim 1, wherein

said determination means determines the quantized value of hierarchy data in a predetermined block in accordance with the quantization step width determined by the upper hierarchy data having a low resolution for each predetermined block, and determines the quantization step width of the lower hierarchy data having a resolution higher than that of said upper hierarchy data based on the distribution of the determined quantized value.

4. The picture encoding apparatus according to claim 3, wherein

said determination means multiplies the quantization step width of said upper hierarchy data by a linear weight to determine the quantization step width of said lower hierarchy data.

5. The picture encoding apparatus according to claim 3, wherein

said determination means multiplies the

quantization step width of said upper hierarchy data by a non-linear weight to determine the quantization step width of said lower hierarchy data.

6. The picture encoding apparatus according to claim 3, wherein

said determination means calculates the quantized value of hierarchy data in a predetermined block in accordance with the quantization step width determined by the upper hierarchy data having a low resolution for each predetermined block of respective hierarchy data to respectively quantize respective hierarchy data, multiplies the quantization step width of said upper hierarchy data by a gain value representing the distribution of said determined quantized value to determine the quantization step width of said lower hierarchy data, and refers the historical information of the gain value of the hierarchy data upper than said lower hierarchy data to determine the gain value representing the distribution condition of said quantized value.

7. The picture encoding apparatus according to claim 1, wherein



said determination means determines the quantized value of the hierarchy data in a predetermined block in accordance with the quantization step width determined by the upper hierarchy data having a low resolution for each predetermined block of respective hierarchy data, and determines the quantization bit number of the lower hierarchy data having a resolution higher than that of said upper hierarchy data based on the quantization step width of said upper hierarchy and the distribution of said determined quantized value, to respectively quantize respective hierarchy data.

10. A picture encoding method for encoding input picture data to generate a plurality of hierarchy data having a plurality of recursively different resolutions, comprising the steps of

determining the quantization characteristics of the lower hierarchy data having a resolution higher than that of an upper hierarchy data based on the activity of said upper hierarchy data having a low resolution, to respectively quantize respective hierarchy data.

11. A picture encoding apparatus for encoding input

picture signal to sequentially generate a plurality of hierarchy data having a plurality of recursively different resolutions, comprising:

determination means for determining the quantized value of the hierarchy data in the target block for each block corresponding to each other between respective hierarchies, based on the quantization step width determined by the upper hierarchy data having a resolution lower than that of the hierarchy data in the target block to be quantized, and for determining the quantization step width of the lower hierarchy data having a resolution higher than that of the hierarchy data in said target block based on the distribution condition of the determined quantized value; and

quantization means for quantizing respective hierarchy data in accordance with said determined quantization step width.

12. The picture encoding apparatus according to claim 11, wherein

respective hierarchy data excepting an uppermost hierarchy data is the inter-hierarchy difference data shown by the difference value of respective hierarchy data excepting said uppermost hierarchy data and the

adjacent upper hierarchy data.

13. The picture encoding apparatus according to claim 11, wherein

said determination means multiplies the quantization step width for said upper hierarchy data by the value showing the distribution of said determined quantized value to determine the quantization step width for said lower hierarchy data.

14. The picture encoding apparatus according to claim 13, wherein

said determination means multiplies the quantization step width for said upper hierarchy data by the linear weight indicating the distribution of said determined quantized value to determine the quantization step width for said lower hierarchy data.

15. The picture encoding apparatus according to claim 14, wherein

said linear weight converges to "1" as the quantization step width of said upper hierarchy data becomes large.





19. The picture encoding apparatus according to claim 11, wherein

said determination means forms a virtual upper hierarchy data having a resolution lower than that of said uppermost hierarchy data from said uppermost hierarchy data, thereafter determines the quantization step width to quantize the uppermost hierarchy data having a lowest resolution based on the calculation of the virtual upper hierarchy data and said uppermost hierarchy data corresponding to the virtual upper hierarchy data.

20. The picture encoding apparatus according to claim 11, wherein

said determination means fixes on a value for the quantization step width of the uppermost hierarchy data having a lowest resolution.

21. A picture encoding method for encoding input picture signal to sequentially generate a plurality of hierarchy data having a plurality of recursively different resolutions, comprising the steps of:

determining the quantized value of the hierarchy

data in the target block for each block corresponding to each other between respective hierarchies, based on the quantization step width determined by the upper hierarchy data having a resolution lower than that of the hierarchy data in the block to be quantized, and determining the quantization step width of the lower hierarchy data having a resolution higher than that of the hierarchy data in the target block based on the distribution of the determined quantized value; and

transmitting respective hierarchy data quantized in accordance with said determined quantization step width.

22. A picture encoding apparatus for encoding input picture signal to sequentially generate a plurality of hierarchy data having a plurality of recursively different resolutions, comprising:

determination means for determining the quantized value of the hierarchy data in the target block for each block corresponding to each other between respective hierarchies, based on the quantization step width determined by the upper hierarchy data having a resolution lower than that of the hierarchy data in the block to be quantized, and for determining the

quantization step width of the lower hierarchy data having a resolution higher than that of said upper hierarchy data based on the history of the distribution of the quantized value of the hierarchy data upper than the lower hierarchy data having a resolution higher than that of the hierarchy data in said target block; and

23. The picture encoding apparatus according to claim 22, wherein

24. The picture encoding apparatus according to claim 22, wherein

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determined quantized value to determine the quantization step width for said lower hierarchy data, and refers the historical information of the gain value of the hierarchy data upper than said lower hierarchy data to determine the gain value showing the distribution of said quantized value.

25. The picture encoding apparatus according to claim 22, wherein

said determination means ~~determines~~ the quantization step width to quantize the uppermost hierarchy data having a lowest resolution, based on the calculation of the pixel of the pixel to be quantized which is contained in the block to be quantized of said uppermost hierarchy data and the pixel of the adjacent pixel neighboring the pixel to be quantized.

26. The picture encoding apparatus according to claim 22, wherein

said determination means forms the virtual upper hierarchy data having a resolution lower than that of said uppermost hierarchy data from said uppermost hierarchy data, and determines the quantization step width to quantize the uppermost hierarchy data having a

lowest resolution based on the calculation of the virtual upper hierarchy data and said uppermost hierarchy data corresponding to the virtual upper hierarchy data.

27. The picture encoding apparatus according to claim 22, wherein

said determination means fixes on the value for the quantization step width of the uppermost hierarchy data having a lowest resolution.

28. A picture encoding method for encoding input picture signal to sequentially generate a plurality of hierarchy data having a plurality of recursively different resolutions, comprising the steps of:

determining the quantized value of the hierarchy data in said target block for each block corresponding to each other between respective hierarchies based on the quantization step width determined by the upper hierarchy data having a resolution lower than that of the hierarchy data in the block to be quantized, and determining the quantization step width of the lower hierarchy data having a resolution higher than that of said upper hierarchy data based on the history of the



29, wherein

said determination means multiplies the quantization bit number of said upper hierarchy data by the value determined by the quantization step width of said upper hierarchy data to determine the quantization bit number of said lower hierarchy data.

31. The picture encoding apparatus according to claim 30, wherein

said determination means multiplies the quantization bit number of said upper hierarchy data by the value determined by the distribution of said quantized value to determine the quantization bit number of said lower hierarchy data.

32. A picture encoding method for encoding input picture signal to sequentially generate a plurality of hierarchy data having a plurality of recursively different resolutions, comprising the steps of:

determining the quantization bit number of the lower hierarchy data having a resolution higher than that of the hierarchy data in said target block for each block corresponding to each other between respective hierarchies, based on the quantization step

width determined by the upper hierarchy data having a resolution lower than that of the hierarchy data in the block to be quantized, to respectively quantize respective hierarchy data; and

transmitting respective hierarchy data quantized in accordance with said determined quantization bit number.

33. A picture encoding apparatus for encoding input picture signal to sequentially generate a plurality of hierarchy data having a plurality of recursively difference resolutions, comprising:

determination means for determining the quantized value of the hierarchy data in said target block for each block corresponding to each other between respective hierarchies, based on the quantization step width determined by the lower hierarchy data having a resolution lower than that of the hierarchy data in the block to be quantized, to respectively quantize respective hierarchy data, and for determining the quantization bit number of the lower hierarchy data having a resolution higher than that of hierarchy data in said target block; and

quantization means for quantizing respective



hierarchy data in accordance with said determined quantization bit number.

34. A picture encoding method for encoding input picture signal to sequentially generate a plurality of hierarchy data having a plurality of recursively different resolutions, comprising the steps of:

determining the quantized value of the hierarchy data in said target block for each block corresponding to each other between respective hierarchies based on the quantization step width determined by the upper hierarchy data having a resolution lower than that of the hierarchy data in the block to be quantized, and determining the quantization bit number of the lower hierarchy data having a resolution higher than that of the hierarchy data in said target block; and

transmitting respective quantized hierarchy data in accordance with said determined quantization bit number.

35. A picture encoding apparatus for encoding input picture signal to sequentially generate a plurality of hierarchy data having a plurality of recursively







quantizing the uppermost hierarchy data having a lowest resolution by the fixed quantization step width; and

quantization means for quantizing respective hierarchy data in accordance with said respective quantization step width.

42. A picture encoding method for encoding input picture signal to sequentially generate a plurality of hierarchy data having a plurality of recursively different resolutions, comprising the steps of:

determining the quantization step width of the lower hierarchy data having a resolution higher than that of said upper hierarchy data for said respective predetermined block of respective hierarchy data based on the quantization step width determined by the upper hierarchy data having a low resolution, and quantizing the uppermost hierarchy data having a lowest resolution by the fixed quantization step width; and

transmitting respective quantized hierarchy data in accordance with said respective quantization step width.

43. A picture encoding apparatus for encoding input picture signal to sequentially generate a plurality of

hierarchy data having a plurality of recursively different resolutions, comprising:

a means for determining the quantization step width of the lower hierarchy data having a resolution higher than that of said upper hierarchy data for each predetermined block of said respective hierarchy data based on the quantization step width determined by the upper hierarchy data having a low resolution, and for determining the quantization step width for quantizing the uppermost hierarchy data having a lowest resolution based on the calculation of the pixel value of the pixel to be quantized which is contained in the block to be quantized of said uppermost hierarchy data and the pixel value of the adjacent pixel neighboring the pixel to be quantized; and

quantization means for quantizing respective hierarchy data in accordance with said respective quantization step width.

44. The picture encoding apparatus according to claim 43, wherein

said determination means determines the quantization step width of said uppermost hierarchy data, based on the calculation of the pixel value of



pixel to be quantized, and the pixel value of said plurality of adjacent pixels contains the value corresponding to the distance from said pixel to be quantized to the respective pixels.

47. A picture encoding method for encoding input picture signal to sequentially generate a plurality of hierarchy data having a plurality of recursively different resolutions, comprising the step of:

determining the quantization step width of the lower hierarchy data having a resolution higher than that of said upper hierarchy data for each predetermined block of respective hierarchy data based on the quantization step width determined by the upper hierarchy data having a low resolution, and determining the quantization step width to quantize the uppermost hierarchy data having a lowest resolution based on the calculation of pixel value of pixel to be quantized which is contained in the block to be quantized of said uppermost hierarchy data and the pixel value of adjacent pixel adjacent to the pixel to be quantized; and

transmitting respective quantized hierarchy data in accordance with respective quantized step width.



48. A picture encoding apparatus for encoding input picture signal to sequentially generate a plurality of hierarchy data having a plurality of recursively different resolutions, comprising:

determination means for determining the quantization step width of the lower hierarchy data having a resolution higher than that of said upper hierarchy data for each predetermined block of respective hierarchy data based on the quantization step width determined by the upper hierarchy data having a low resolution, and after forming the virtual upper hierarchy data having a resolution lower than that of said uppermost hierarchy data from said uppermost hierarchy data, for determining the quantization step width to quantize the uppermost hierarchy data having a lowest resolution based on the calculation of the virtual upper hierarchy data and said uppermost hierarchy data corresponding to the virtual upper hierarchy data, to respectively quantize respective hierarchy data; and

quantization means for quantizing respective hierarchy data in accordance with said respective quantization step width.



different resolutions, comprising the step of:

determining the quantization step width of the lower hierarchy data having a resolution higher than that of said upper hierarchy data for each predetermined block of respective hierarchy data based on the quantization step width determined by the upper hierarchy data having a low resolution, and after forming the virtual upper hierarchy data having a resolution lower than that of said uppermost hierarchy data from said uppermost hierarchy data, determining the quantization step width to quantize the uppermost hierarchy data having a lowest resolution based on the calculation of the virtual upper hierarchy data and said uppermost hierarchy data corresponding to the virtual upper hierarchy data, to respectively quantize said respective hierarchy data; and

transmitting respective quantized hierarchy data in accordance with said respective quantized step width.